Angled Tenon Jig

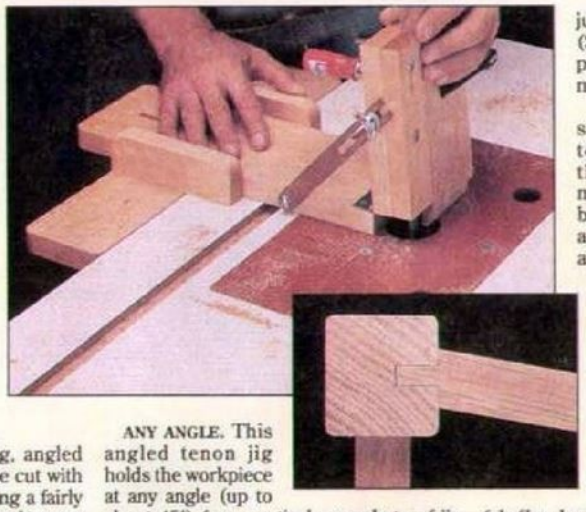
When you want to use a mortise and tenon joint to join two pieces at an angle, you have a choice to make: cut an angled tenon or bore an angled mortise. I would always choose the angled tenon.

The challenge is figuring out the best way to cut the tenons at an identical angle at *both* ends of the workpiece — with the least amount of fuss. So I came up with a jig for the router table.

For the Oak Rocking Chair on page 6, the tenons at each end of the side rails have to be cut at a 3° angle. The problem is the angled tenons at each end must be parallel, and so must the shoulders, see the inset photo.

But with this router table jig, angled tenons up to about 1" long can be cut with just a straight bit. And by following a fairly simple procedure, the shoulders and tenons are cut parallel. And at the exact same angle.

The jig can be used for other projects, too, because it's adjustable for different angles.



ANY ANGLE. This angled tenon jig holds the workpiece at any angle (up to about 45°) from vertical, see photo of jig above. Then, as the jig is run along the front edge of the router table, a perfect angled tenon can be routed on the workpiece with just one pass in each direction. (See Using the Jig on the facing page for the steps involved in making an angled tenon.)

ADJUSTABLE THICKNESS. Besides being adjustable to cut tenons at different angles, there's another feature that makes this jig useful. It can also be used to cut tenons of just about any thickness, on almost any size stock.

What makes this possible is a carriage bolt in a slot, and a wing nut. These hold the two main parts of the jig together and allow the working end of the jig (the pivoting face) to be positioned at different distances from the router bit.

MATERIALS. I made the jig from a couple short lengths of scrap hardwood plus a handful of hardware. A pair of butt hinges permits the jig to tilt, and a pivot arm made from Masonite securely holds the pivoting face at an angle while the tenon is being routed.

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MAKING THE JIG

The Angled Tenon Jig consists of two main assemblies: a base assembly and a runner assembly. The base assembly has a **base** piece that lies flat on the router table, and a **pivoting face** that holds the standing workpiece at an angle, see Fig. 1.

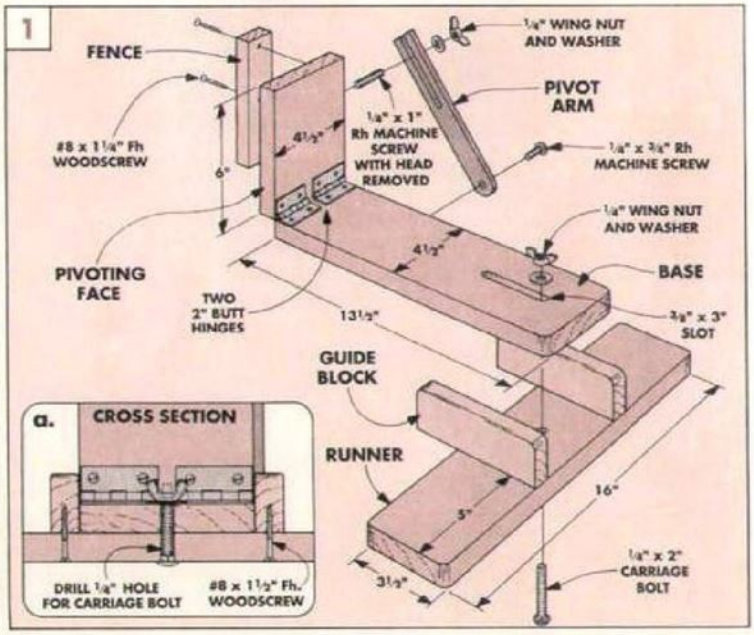
The runner assembly is attached to the end of the base assembly. It consists of a **runner** that slides along the front of the router table to keep the base a fixed distance from the router bit.

Attached to the runner are a pair of **guide blocks** that hold the base perpendicular to the front edge of the table.

Note: To make the jig more comfortable to use, I rounded over the edges of the guide blocks, see Fig. 1. Also, I sanded a radius on each corner of the runner assembly pieces, and the outside corners of the base. Rout and sand these pieces before assembly.

ASSEMBLY. To assemble the parts, start by attaching the guide blocks to the runner. Install the screws from the bottom of the runner, using the base as a spacer to keep the blocks the correct distance apart, see Fig. 2.

Then hinge the pivoting face to the inside end of the base, see Fig. 3. (I used a pair of 2"-long butt hinges.) Now, attach the base to the runner with a 2"-long carriage bolt



through a hole in the runner and a slot in the base, see Figs. 1 and 2.

PIVOT ARM. To support the pivoting face at an angle, I cut a **pivot arm** from a piece of ¼"-thick Masonite, see Fig. 3. The arm has a pivot hole in one end and an adjustment slot in the other end.

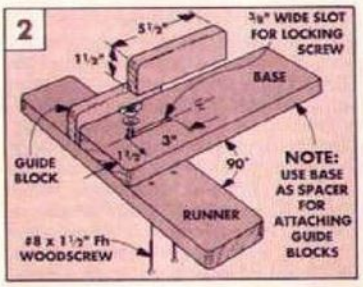
Cut (or sand) a radius on the lower end of the pivot arm, then attach it to the base and pivoting face with machine screws.

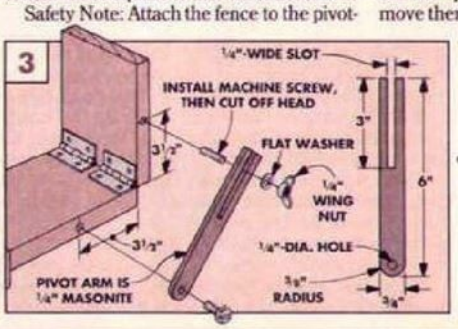
FENCE. Finally, cut and screw a short **fence** to the front of the pivoting face, see Fig. 4. This holds the workpiece securely to the jig as the tenon is being routed.

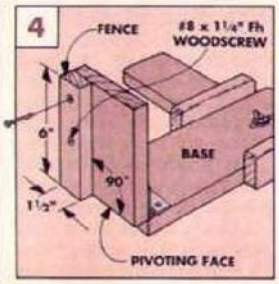
As long as the fence is attached at a 90° angle to the router table, the shoulders of the tenon will be square to the end of the tenon.

Safety Note: Attach the fence to the pivoting face with the screws positioned at least 3" up from the bottom of the fence. This way, the router bit won't cut into the screws as the jig is being used.

On a tenon longer than ¾", the router bit *can* cut into the lower ends of the fence and pivoting face. That's all right because these can be replaced later if necessary — just remove them from the hinges on the inside.







USING THE JIG

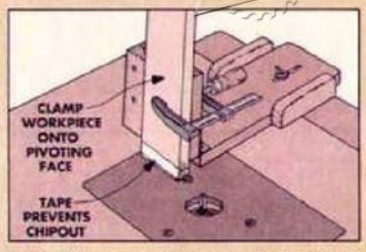
Most angled tenons can be cut in just two passes over a ½" straight bit in the router table. The first pass cuts one cheek of the tenon. Then the tenon is completed in a second pass. Only the position of the jig is moved between passes — the workpiece stays clamped on the front.

LAY OUT TENON. Before using the jig, first cut the ends of the workpiece at the correct angle. Then draw the outline of the tenon at the desired angle on the edge of the workpiece at each end.

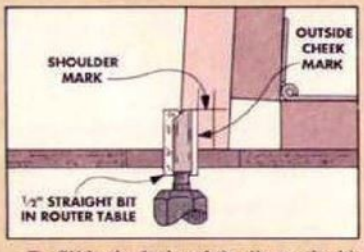
The layout marks should indicate the angle, length, and thickness of the tenon.

SET UP JIG. When the tenon is laid out on the workpiece, the jig and router bit need to be adjusted, see Steps 1 thru 3 below. Note: *Don't* raise the router bit higher than 1" — it can cut into the hinge screws. And to prevent tear-out along the shoulder, stick a piece of masking tape to the face, see Step 2.

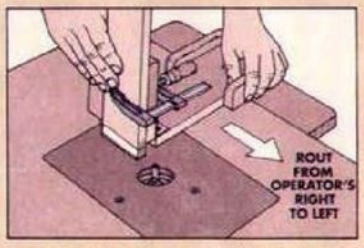
1 *Miter a piece of scrap to use as a guide for setting tenon angle. Then tighten the wing nut on the end of pivot arm.*



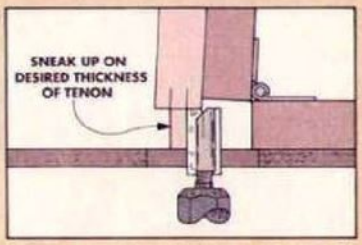
2 *Clamp workpiece to jig so the edge is tight to the upright fence. The end of the workpiece should be flat on router table.*



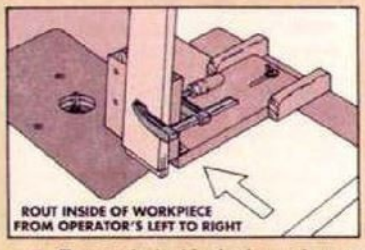
3 *Slide the body of the jig so the bit aligns to the outside cheek mark. Raise the bit to align to the shoulder mark.*



4 *Cut the outside of the tenon by holding the runner tight to the front of the table and sliding the jig from right to left.*



5 *To complete the tenon, adjust the jig so the bit aligns to the inside cheek mark. Do not change the height of the bit.*



6 *To rout the inside cheek, you have to slide the jig in the opposite direction (from left to right) to avoid kickback.*